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Temporal patterns of boat activities around dugong habitat in Trang Province, Thailand

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ABSTRACT
We investigated the monthly and daily patterns of boat activities around dugong habitat in Trang Province. We interviewed local fishermen and tourism officers at five coastal villages around Muk and Talibong Islands to investigate when they operate boats. We obtained answers from 103 fishermen and 15 tourism officers. It was found that local fishermen catch crabs, squids, and fishes all the year round. Crab and squid fishing were especially active from July through November. They mostly worked in the daytime (0500h – 1800h), especially in the morning. Guided tour boats were operated in the daytime (0800h – 1700h) and only from November through April. We have also analyzed information on boat noises provided by underwater sound data recorded off the southern coast of Talibong Island in November 2006. A lot of boat noises were detected in the morning. The results show that the daily patterns of local boat activities almost fit with the daily pattern of boat noise as shown by sound data.

Keywords: interview, boat activity, small-scale fishery, tourism,

INTRODUCTION

Human activities along the coastal area are increasing worldwide. Human impacts on marine mammals has been of much concern (Nowacek *et al.*, 2007). Dugongs are one of the most endangered marine mammals in the world (Marsh *et al*. 2002). They are vulnerable to anthropogenic influences because they live in shallow waters. One of the threats to dugongs is the destruction of their habitats by human activities. Dugong deaths caused by entanglement in fishing nets have been reported (Adulyanukosol *et al.*, 2009). However, little is known about human impact on dugongs. Understanding the temporo-spatial patterns of human activities would be important in assessing human impact on dugongs.

In this study, we focused on boat traffic around the dugong habitats in Trang Province, Thailand. The largest population of dugongs along the Andaman coast of Thailand exists in Trang Province (Hines *et al*., 2005). It is one of the most important areas for dugongs feeding and reproduction especially surrounding the Muk and Talibong Islands (Hines *et al.* 2005; Adulyanukosol *et al.* 2007), because of the presence of extensive seagrass beds (Changsan and Poovadiranon 1994). Some types of commercial fisheries are restricted around the area to not operating within 3 km of the shore because of wildlife protection laws (*i.e.* Ko Libong Non-hunting Area). Local people operate small-scale fisheries with small boats. In recent years, several types of tour boats have been operating in the focal area.

The purpose of our study was to understand when the boats are most active around dugong habitat.

MATERIALS AND METHODS

We conducted an interview survey at local villages around Muk and Talibong Islands in Trang province, Thailand (Figure 1). We interviewed local people at coastal villages with a Thai-English translator using questionnaire sheets. We determined sample sizes with reference to some previous interview research on the fisheries activities conducted around the Muk and Talibong Islands (Sulong and Chealee 2004; Chatchawanchonteera and Semsan 2005; Jantho and Khankhachon 2005; Petchkaew and Yaming 2005). We visited three villages (Batuputae, Langkhao, and Prouw) in Talibong Islands, one village on the Had Mod Tanoi, and one village in Muk Island on November 20 and 22, 2010.

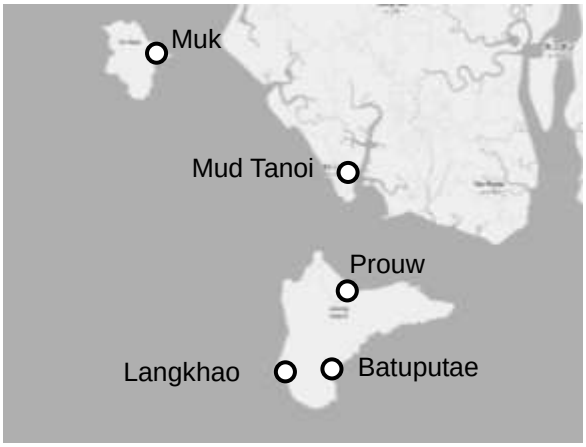

Figure1. Study area in Kantang district, Trang Province, Thailand. The five villages where we conducted interview survey are shown with circles.

We asked fishermen about age, years of operation, boat size and type, target fish, fishing gear, operation months and hours of each target fish. We also asked tourism officers about years of operation, boat size and type, operation months and hours. The questionnaire included closed-ended questions

We also analyzed the information on boat noises provided by underwater sound data recorded off the south coast of Talibong Island on November 16 – 23, 2006. We compared the daily patterns of boat activities between interview data and sound data.

RESULTS

We obtained answers from 103 fishermen and 15 tourism officers. The numbers of interviewed fishermen in each village were 21 at Batuputae, 33 at Langkhao, 5 at Prouw, 15 at Mod Tanoi, and 29 at Muk. The numbers of interviewed tourism officers in each village were 1 at Prouw, 1 at Mod Tanoi, and 3 at Muk. The characteristics of fisheries and tourism were not much different among 5 villages. We pooled the data from all villages.

I. Fishermen

Basic information of fishermen and their boats

The age of fishermen were from 17 to 74 years old (average 42.2 years old). More than half of them had been fishing over twenty years (n = 59, 57.3%, Figure 2). Most fishermen used the long-tailed boat with engine (n = 96, 93.2 %, Figure 3). We categorized the boat length; <5 m, 6 – 10 m, and >=11 m to roughly know the boat size they use. Boats with 6 – 10 m in length were mainly used (n = 59, 57.3 %, Figure 4). A few fishermen did not own a boat and were employed by others.

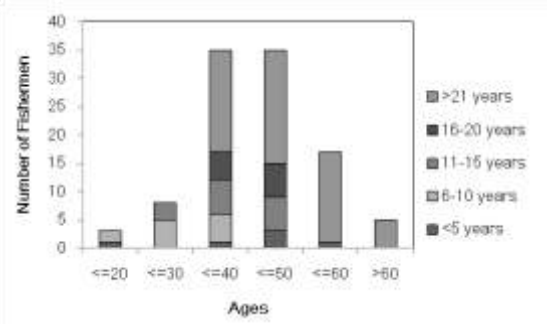

Figure 2. The work experience of fishermen at ages.

Figure 3. Local fishermen usually use the long-tailed boat with engine.

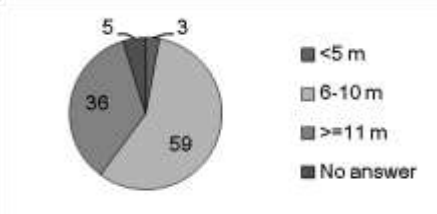

Figure 4. The lengths of fishing boats

Fishing gear and target species

Gill nets, traps and hooks were commonly used for crab, squid, and fish catching. They use the traps and hooks for squid fishing. They set the squid traps on the seafloor for two months, checking them every morning and/or evening.

Operation months and hours

It was found that local fishermen catch crabs, squids, and fishes all the year round (Figure 5). Crab fishing was especially active from July through October. Squid fishing was especially active from August through November.

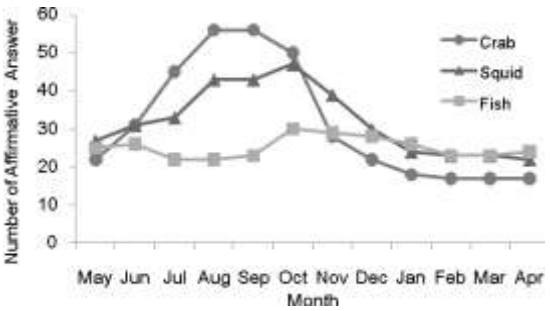

Figure 5. Operation months of fishing boats (n = 103): vertical axis indicates the number of affirmative answers

They mostly worked in the daytime (0500h – 1800h), especially in the morning (Figure 6). They checked traps every morning and evening. If they found any fishes in the traps, they collected them in the morning.

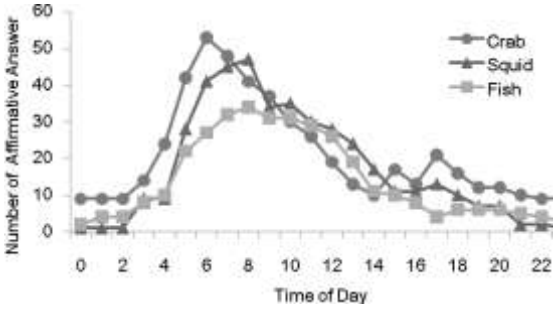

Figure 6. Operation hours of fishing boats (n = 103)

II. Tourism officers

Basic information of tourism officers and their boats

The operation years were in the range of 2 to 15 years (average 7.7 years). One of the tourism officers operated only a transport boat. Eleven of them operated only for guided tours. Three of them operated for both transportation and guided tours. Ten of the tourism officers used long-tailed boats with engine (66.7%). Three of them had small boats with powerful engines. One of them had a ferry. Three of them used a rental boat for guided tours. Mostly boats larger than 11 m in length were used (n = 11, 73.3%).

Operation months and hours

The transport boats were operated almost all year round. Guided tour boats were operated only from November through April, except for one office (Figure 7). Their operation hours ranged from 0800 h to 1700 h, although it depends on the tourist demands (Figure 8).

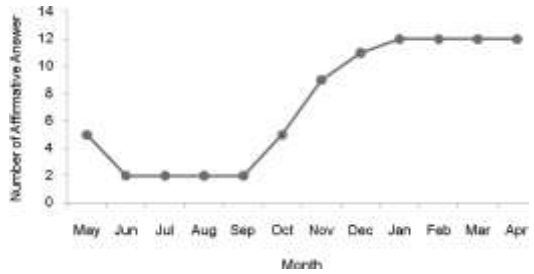

Figure 7. Operation months of tour boats (n = 15)

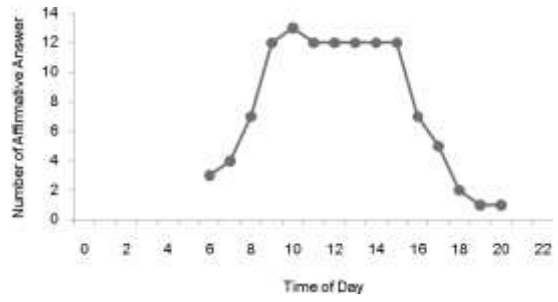

Figure 8. Operation hours of tour boats (n = 15)

III. Comparison of the daily patterns of boat activity between interview data and sound data

We compared the daily patterns of boat activities between the interview data and sound data. From the underwater sound data, 323 boat passing noise were detected (Figure 9). A lot of boats were detected in the morning. The occurrence patterns of boat activities were almost the same in both data.

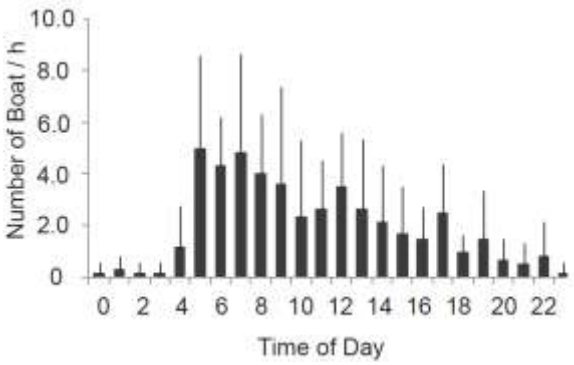

Figure 9. The average number of boat per hour; which was detected from the underwater sound data recorded off the coast of Talibong Island during November 16 – 23, 2006.

DISCUSSION

It was found that local fishermen operated boats all year around. For crab and squid fishing, there were seasonal peaks. Fishermen told us that they catch a lot of crabs with eggs in summer when it is a rainy and windy season. It was also reported that the abundance of female crabs with eggs peaked during August – September around Talibong Island (Nitiratsuwan *et al.*, 2010). Our interview result also agreed with that seasonal abundance of crabs. Tour boats were mostly operated only from November through April which is the dry season. In the dry season, more tourists visit the coastal areas and islands for recreational activities. Some of fishermen might operate guided tour boats in the dry season to earn more money. The income of local fishermen around the focal area is low (Sangarun and Hengbunmee, 2007). These activities might depend on their economic status.

On hourly basis, both fishing and tour boats were mostly operated in the daytime. Fishing boats were more active in the morning. In sound data, there were slight peaks at 1200 h and 1700 h (Figure 9). These peaks would represent that fishermen went back to the port from the fishing operation and went to check traps in the evening.

In general, boat noise largely contributes to ocean noise (Richardson *et al*., 1995). In the focal area, the underwater noise levels were relatively high in the morning (Ando-Mizobata *et al.*, 2011). Noise levels in our focal area seem to be strongly influenced by boat noise. We suggest that underwater noise levels would also change seasonally and daily depending on the boat traffic.

We showed the temporal pattern of boat activities around dugong habitat. We will need further analysis on the spatial pattern of boat activities to understand where the boat activities are likely to have the greatest impact to dugong habitats.

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